

**ROCKY FLATS PLANT  
GOLDEN, COLORADO**

**TECHNICAL REVIEW OF DRAFT PLUTONIUM IN SOILS  
TREATABILITY STUDIES WORK PLANS:  
TRUclean PROCESS AND MAGNETIC SEPARATION**

Prepared for

**U.S. ENVIRONMENTAL PROTECTION AGENCY  
Region 8 Federal Facilities Remedial Branch  
Denver, Colorado**

Work Assignment No.	:	C08055
EPA Region	:	8
Site No.	:	C07890010526
Date Prepared	:	January 30, 1992
Contract No.	:	68-W9-0009
PRC No.	:	012-C08055
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## 1.0 INTRODUCTION

PRC Environmental Management, Inc. (PRC) has conducted a technical review of the draft plutonium in soils treatability studies work plans: TRUClean process and magnetic separation for soils from operable unit (OU) 2 at the Rocky Flats Plant (RFP). This document was prepared by the U.S. Department of Energy (DOE) in November 1991. PRC prepared these comments for the U.S. Environmental Protection Agency (EPA) under contract number 68-W9-0009, Technical Enforcement Support (TES) 12, work assignment number C08055.

The technical review comments have been divided into two sections containing general and specific comments. The general comments apply to the entire report, while the specific comments are referenced to statements in the draft report by page and paragraph number. Typographical and editorial problems were not identified.

EPA has requested that treatability study work plans for the individual OUs be prepared following the guidance outlined in Section 6.0 of the RFP final site-wide treatability studies plan (TSP) (DOE, 1991). Therefore, the review of this document was conducted to determine its technical adequacy and adherence to EPA guidance.

Several areas of the draft plutonium in soils treatability studies work plans require revision to comply with the recommendations of the final site-wide TSP. However, the outline of the work plans follows EPA guidance and nearly all requested items have been addressed in this first draft.

## 2.0 GENERAL COMMENTS

1. The project scope section of the final site-wide TSP (Section 6.2) suggests several items that have not been included in the introduction section of the draft plutonium in soils treatability studies work plans document. These are a brief description of the technology, a schematic flow diagram of the process showing the unit processes being evaluated, the main process stream, and any process residuals being generated. These should be included in the Introduction (Section 1.0) of the treatability studies work plans.

2. To simplify the document, the text regarding sampling plutonium-contaminated soils to support treatability tests at Nevada Test Site (NTS) and Los Alamos National Laboratory (LANL) (Attachment 1, Volume I) should be combined with the field sampling plan text on plutonium in soils treatability study (Section I, Volume II). Additionally, the section describing soil sample chain of custody (Section 9.0) should be included in the field sampling plan as requested in the sitewide TSP.

### 3.0 SPECIFIC COMMENTS

#### VOLUME I

1. Page 25, Paragraph 2. This paragraph discusses how each unit operation will be optimized during Phase I using plutonium-contaminated soil. It is unclear from this discussion whether individual units in the process will be evaluated using raw soil or soil treated by the optimized unit upstream of the unit being evaluated. This point should be clarified.

Rationale: The text should clearly state which material will be used to evaluate downstream units. Equipment designed to process treated soil should not be evaluated using untreated soil.

2. Page 34, Paragraph 5. This paragraph discusses the steps in the treatability study. Steps 4 and 8 discuss raising the pH of the solution in the final optimization runs to 12 or 12.5. The purpose of this pH adjustment should be explained to clarify its importance in the optimization process.

Rationale: Adjusting the pH of the soil slurry appears to be an important optimization step. It should, therefore, be discussed in this section.

3. Page 39, Paragraph 1. This paragraph describes the process equipment and operating parameters; however, it does not give specific manufacturer and model number information for the equipment as requested in Section 6.5 of the final site-wide TSP. If these pieces of

equipment are commercially available, this section should list manufacturer and model numbers for each piece of equipment.

Rationale: The site-wide TSP stipulates that equipment manufacturer and model numbers be included in the equipment description portion of the work plan.

4. Page 54, Paragraph 2. This paragraph discusses the regulatory requirements involved in the TRUclean treatability study; however, it does not address the requirement stated in Section ~~6.8 of the site-wide TSP that monthly reports by the subcontractor be sent to EG&G~~. Additionally, Section 6.8 of the site-wide TSP stipulates that annual reports be made by the subcontractor to the Colorado Department of Health (CDH). This section of the work plan should discuss the presentation of monthly reports to EG&G and annual reports to CDH.

Rationale: To comply with the requirements of the sitewide TSP, monthly and annual reports should be discussed in the treatability study work plans.

5. Page 56, Section 7.7. This section discusses the management of residual material generated during the treatability study. It does not include estimates for the amounts and types of contaminated protective clothing, debris, and liquid waste generated during the project that will be transported from NTS and LANL to RFP. This section should present estimates of these volumes and discuss how these materials will be analyzed to determine the amount of radioactivity they contain.

Rationale: The estimated volumes of wastes and contaminated clothing generated in the treatability study process will contribute to its evaluation as a potential treatment.

6. Page 58, Paragraph 7. This section presents the health and safety plan for activities to be conducted at NTS. It describes the primary hazard as low levels of plutonium that will be concentrated during the cleanup process. The health and safety plan should note that ingestion and inhalation of plutonium-contaminated soil are dangers associated with this process.

Rationale: The primary routes of exposure during the treatability study process unit operation should be described in the health and safety plan.

7. Page 60, Figure 7.9-1. This figure presents a bar chart schedule of the TRUclean treatability tests. Soil sample collection and shipment was scheduled to occur between October 1991 and February 1992. From the figure it appears that EG&G will be behind schedule if the soil to be tested is not collected by the end of February 1992. If the soil will not be collected by that time, the schedule should be revised, within the guidelines of the RFP, Interagency Agreement to reflect a more probable starting date for the study.

Rationale: The schedule should be accurate to promote the utility of the document.

8. Page 66, Paragraph 2. This paragraph discusses optimization of the high gradient magnetic separator (HGMS) using copper oxide (CuO) as a surrogate for plutonium oxide (PuO<sub>2</sub>). It does not discuss how the size(s) of CuO particles used in the various tests will be chosen. The paragraph should describe the procedures to choose the sizes of CuO particles. If CuO is to be used as a PuO<sub>2</sub> surrogate, its size will be critical in evaluating the ability of the technology to remove paramagnetic particles similar to those found in soil at RFP.

Rationale: This procedure should be described in detail to enhance the utility of the treatability study work plan.

9. Page 80, Paragraph 3. This paragraph discusses the samples to be taken from the locations shown on Figure 8.3-2. It states that influent and effluent samples will be taken from the HGMS process soil. To provide an activity balance around the HGMS process, a sample should also be taken of the separator medium containing the removed plutonium.

Rationale: An activity balance around the HGMS process evaluated in this test should be part of the evaluation to provide complete data from the treatability study.

## VOLUME II, SECTION I

10. Page 3, Paragraph 2. This paragraph states that the objective of the sampling effort is to provide data for the NTS-hosted evaluation of gravimetric separation techniques for removing plutonium and americium from soils. This paragraph should also indicate that much of this sampling is being done to provide soil for both the NTS work and the magnetic separation treatability tests scheduled at LANL.

Rationale: To enhance the clarity and utility of the document, the treatability study work plan should present comprehensive information on the uses of soil samples.

11. Page 7, Paragraph 3. This paragraph discusses the location of the soil sample for the treatability study. Section 6.5 of the final site-wide TSP stipulates that the location be identified on a site map and one or more cross sections. No cross sections are provided. At least one cross section should be included in this section.

Rationale: A cross section of the sampling location should be included as required in the final sitewide TSP.

## SECTION II

12. Page 10, Paragraph 2. This paragraph states that soil will be wetted prior to sampling to minimize the potential for resuspension of plutonium-contaminated dust. However, page 1 of attachment 1, volume 1, states that sample splitting will require that the soil not be wet, and that it have a moisture content of less than 10 percent. This conflict in procedures should be resolved.

Rationale: The sample collection procedure should not conflict with other procedural requirements.

### SECTION III

13. Page 15, Paragraph 4. This paragraph states that the treatability study contractors shall maintain and report the status of the process operations to the EG&G RFP treatability study project manager; however, no schedule or specific information is provided. This paragraph should provide a schedule for reports.

Rationale: Sections 6.8 and 6.13 of the final site-wide TSP stipulate that monthly reports should be provided to the EG&G project manager by the subcontractor. The schedule and report obligations should be recognized and incorporated in the plan.

#### 4.0 REFERENCES

DOE, 1991, Final Treatability Studies Plan, U.S. Department of Energy, Rocky Flats Plant, August 26, 1991.